COURSE SYLLABUS: 1327 AN EXPERIMENTALIST'S TOOLBOX[1]

Course Overview and Objectives

When a leader touts firm performance indicators and how they have changed over recent years, what can you attribute those changes to? How much stock can you place in evidence from an employee survey? When you learn that a new digital initiative might transform a firm or an industry, what tools do you have to evaluate that claim? Many people approach these questions naïvely, relying solely on past experiences, heuristics, and intuitions.

This course focuses on evidence-based decision-making through experiments. We will discuss the logic of experimentation, its strengths and weaknesses in relation to other methodologies, and its applications in studying social phenomena. We will cover lab-based experiments, web-based experiments, and field experiments. Participants will engage with the subject through lectures, hands-on in-class experiments, and discussions around pertinent research papers.

General Information

Instructor: Hui Sun (hui.sun@hhs.se) Assistant Professor at the Department of Entrepreneurship, Innovation and Technology

Location: A336 (Sveav 65, 3rd floor)

Purpose

The course prepares aspiring researchers, policymakers, and future managers with the mindset of evidence-based decision-making and the toolbox of an experimentalist. We will delve deep into the philosophy of experimental intervention, the technicality of experimental design, and the varying usage of experiments in academic research and industry practice.

Prerequisites

The course is intended for graduate students: MSc and PhD.

(a) Participants need to have taken and understood undergraduate statistics.

[1] The syllabus draws inspirations from Jillian Chow's PhD seminar on macro research methods at Northwestern Kellogg and Alain Cohns's course on experiment design and analysis at University of Michigan.

(b) Participants should be curious about experiments and the methodological practices and innovations at the vanguard of social science.

(c) Some working knowledge of R is preferred prior to the course.

Course Structure

This course combines lectures and in-class discussions. Participants will be evaluated based on individual assignments and a final project. Individual assignments will focus on conceptual and technical steps in experimental design. It is acceptable and encouraged to collaborate on individual assignments, but each assignment will be graded individually. The final project is a research proposal that entails designing an experiment on a research topic of interest to the participant.

A final grade (Pass, Good, Very Good, Excellent) will be awarded to each course participant based on that person's performance across all assessment activities. In accordance with school policy, a grade of "Excellent" is available only for approximately 25% of students enrolled. Office hours will be available by appointment.

Homework (60%): Homework assignments are due throughout the period.

Final Project (40%): A final project is due at the end of the course. The final project will incorporate skills, methods, and theories covered in lectures. More details about the final project will be provided during the course. Depending on the size of the class, a final project presentation may be incorporated as part of the evaluation.

Attendance: Much of what is taught in 1327 is confined to technical journals or advanced textbooks. The subject matter will be clarified in the lectures. It is not reasonable that any student can expect to earn a grade of Excellent without attending almost every class.

Intended Learning Outcomes (ILOs)

The overall intended learning outcome (ILO) for the course is that upon completion, course participants should be able to understand and apply experiments as tools to address problems and understand causation using the scientific method. Successful participants will be able to design, analyze, and interpret real experiments in a way that can be useful in executing experimental projects. Students will also, at the end of this course, be able to skeptically evaluate and assess research reports. More specifically, after completing the course students should be able to:

1. Gain a concrete understanding of fundamental concepts and principles of experimental design.
2. Develop skills necessary to define research questions, formulate key constructs, and design effective experiments.
3. Acquire the knowledge and skills to critically evaluate experimental studies in social science literature.

Schedule

The planned schedule of the course is as follows. The course schedule is open to adjustments as the course progress.

Session 1. From an Experimentalist's Point of View. 1/17

Why do we need experimental methods? How are experiments used in sociology, economics, psychology, and business (e.g., management, strategy, marketing, information systems)? What are the pros and cons of experimental methods? This session will cover the basics of experiemental design: theories, hypotheses, operationalization, internal and external validity.

In-class exercise: How to read an experimental paper?

- **Guiding questions when reading an experimental resarch paper:**
  - What is the research question and are you convinced we should care about it?
  - What is the ideal experiment to test the research question?
  - What is the setting and how do the authors justify it?
  - Why is their method a good fit for their research question?
  - What does a row in the dataset look like? What is the unit of analysis?
  - Do you believe their findings and their claims? Why or why not?
  - How do they present their findings/data? Do they have a "killer visual"? (or.... could they have created something?)
  - How do they address generalizability/boundary conditions?

Session 2. Conceptualize an Experiment (Part I). 1/22

Experimental design is both a science and a craft. In this session, we will learn from prior studies to see how researchers creatively tackle common problems in experimental design.

Homework 1: Replication exercise. Due before Session 4 (1/29, 10:00 CET).

Session 3. Conceptualize an Experiment (Part II). 1/24

Some of you may heard of the term "replication crisis" and heated discussion around the existence of priming effect or power pose. Why is there a replication crisis? How much confidence should we attribute to a single study? What do we mean exactly by replication? What are the current best practices in experimental design? In this session, we will also cover the pragmatic aspect of ethical review in Sweden and GDPR regulations on data storage. Multiple testing and reproducibility, ethics (deception, anonymity, informed consent).

Debate: Is it ethical? Deception, anonymity, potential harm and informed consent

- Bursztyn, L., Cantoni, D., Yang, D. Y., Yuchtman, N., & Zhang, Y. J. (2021). Persistent political engagement: Social interactions and the dynamics of protest movements. *American Economic Review: Insights*, *3*(2), 233-250.

- Ederer, F., Goldsmith-Pinkham, P., & Jensen, K. (2023). Anonymity and Identity Online. *slides presented at NBER Summer Institute*, *20*.

Session 4. R Basics. 1/29

This session will go over some basic operations and data wrangling in R.

Important preparations: Make sure to install RStudio and familiarize yourself with the basics of R before the class. If you have never used R before, here is a free online course to help you get started. You will want to go through the "Introduction" and "Getting started with coding" sections, which will take a little more than 3 hours in total.

Session 5. Planning and Execution (Part I). 1/31

Let's get our hands dirty! This session will cover all the major steps that you would want to consider before data collection. This includes: sample size determination, power analysis (optional: power analysis with moderation and/or mediation), specifying exclusion criteria, and pre-registration.

Session 6. Planning and Execution (Part II). 2/5

Now we've got our data, what do we do next? This session will go through some common steps that we need to take after data collection. This includes: attrition analysis, attention check, manipulation check, (balance check), common statistical tests, and creating a killer figure.

Homework 2: Replication exercise. Due before Session 8 (2/12, 10:00 CET).

Session 7. Field Experiments (Part I). 2/7

Field experiments are gaining momentum. When would we decide to conduct a field experiment? What are the advantages of field experiments in comparison to lab experiments? What are the challenges of field experiments? in this session, we will go through some examples.

Session 8. Field Experiments (Part II). 2/12

This session will delve into the details in designing and implementing field experiments. This will be done in a similar fashion as session 5 and 6.

Homework 3: Replication exercise. Due before Session 10 (2/19, 10:00 CET).

Session 9. AB Testing. 2/14

Now we have learned all the foundations of experimental methods, what are the commonalities and differences among academics, policy makers and business managers in the way they design, evaluate and understand experiments? How can things go wrong when we move beyond our well-controlled labs into the messy and complex reality? In this session, we will learn through cases from past experience.

Session 10. Advanced Tools and Topics. 2/19

Session 11. TBD. 2/26